AMENDMENTS TO CLAIMS

1.   (currently amended) (Currently Amended) A method for determining the source of audio

signal degradation in an Internet Protocol (IP) telephony environment, the method

comprising the computer-implemented steps of:

for each switching device of a set of switching devices that are configured on a network

between a first endpoint and a second endpoint,

storing a reference version of an audio signal waveform at an originating device;

transmitting, from an the originating device to the switching device, [[a]] the

reference version of an the audio signal waveform;

receiving at the originating device from the switching device a second version of

the audio signal waveform that represents the waveform after transmission

at least to the switching device;

computing at the originating device audio signal degradation that occurred

between the originating device and the switching device by comparing the

reference version of the audio signal waveform with the second version of

the reference version of the audio signal waveform; and

determining the source of audio signal degradation in a path between the first

endpoint and the second endpoint based on the audio signal degradations

associated with each of the switching devices of the set of switching

devices; and

storing an identifier of the source of audio signal degradation.

2.   (currently amended) The method of claim 1, wherein the step of computing audio <u>signal</u> degradation includes computing audio <u>signal</u> degradation with a perceptual measure.

3.   (currently amended) The method of claim 1, wherein the step of computing audio <u>signal</u> degradation includes computing audio <u>signal</u> degradation using Perceptual Evaluation of Speech Quality (PESQ) techniques.

4.   (canceled)

5.   (currently amended) The method of claim 4,

wherein the step of receiving includes receiving the second version of the audio <u>signal</u> waveform over a reliable <u>Transmission Control Protocol (TCP)</u> connection after the switching device timestamps packets that it received that correspond with the reference version <u>of the audio signal waveform</u> that was transmitted by the originating device and buffers the packets before sending them to the originating device over the reliable TCP connection; and

wherein the step of computing the audio <u>signal</u> degradation consists of computing the audio <u>signal</u> degradation that occurred in a path from the originating device to the switching device.

6.   (currently amended) The method of claim 1,

wherein the step of receiving includes receiving the second version of the audio <u>signal</u> waveform at the originating device from the switching device; and

wherein the step of computing the audio <u>signal</u> degradation consists of computing the

audio <u>signal</u> degradation that occurred in a round-trip path between the

originating device and the switching device.

7.   (currently amended) The method of claim 1,

wherein the step of receiving includes receiving the second version of the audio <u>signal</u>

waveform at the switching device; and

wherein the step of computing includes computing the audio <u>signal</u> degradation at the

switching device.

8.   (currently amended) The method of claim 7, further comprising the computer-

implemented step of:

for each switching device of a set of switching devices, receiving from the switching

device a measure of the audio <u>signal</u> degradation that was computed at the

switching device.

9.   (original) The method of claim 1, further comprising the computer-implemented step of:

determining the set of network switching devices that are configured on the network

between the first endpoint and the second endpoint.

10.   (original) The method of claim 1, further comprising the computer-implemented step of:

determining the set of network switching devices that are configured on the network

between the first endpoint and the second endpoint by determining a set of

network switching devices that are in a path from the first endpoint to the second

endpoint.

11.   (original) The method of claim 10, further comprising the computer-implemented step of:

determining the set of network switching devices that are configured on the network

between the first endpoint and the second endpoint by determining the set of

network switching devices that are configured in a path from the second endpoint

to the first endpoint.

12.   (original) The method of claim 11, wherein the path from the first endpoint to the second

endpoint is different than the path from the second endpoint to the first endpoint.

13.   (original) The method of claim 1, wherein the set of switching devices comprises every

switching device configured on a path between the first endpoint and the second

endpoint.

14.   (original) The method of claim 1, wherein the set of switching devices comprises a subset

of the switching devices configured on a path between the first endpoint and the second

endpoint.

15.   (original) The method of claim 1, wherein the step of transmitting is performed for each

switching device of the set of switching devices in a sequential order from a switching

device that is nearest to the first endpoint to a switching device is that is nearest to the

second endpoint.

16.   (original) The method of claim 1, wherein the steps are performed by one or more

intermediate network switching devices.

17.   (original) The method of claim 1, wherein the steps are performed by one or more

network routers.

18.   (currently amended) A method for determining audio signal degradation in a path of an

Internet Protocol (IP) telephony environment, the method comprising the computer-

implemented steps of:

receiving from an originating device, at a network switching device, a reference version

        of an audio signal waveform; and

transmitting to the originating device a second version of the reference version of the

        audio signal waveform that represents the audio signal waveform after

        transmission at least to the network switching device, for computing audio signal

        degradation that occurred in a path between the originating device and the

        network switching device by comparing the reference version of the audio signal

        waveform with the second version of the reference version of the audio signal

        waveform.

19.   (original) The method of claim 18, wherein the steps are performed by an intermediate

network switching device.

20.   (original) The method of claim 18, wherein the steps are performed by a network router.

21.   (currently amended) The method of claim 18, wherein the reference version of the audio

signal waveform is received as a series of packets, the method further comprising the

computer-implemented steps of:

attaching a timestamp to each of the packets of the series of packets;

buffering each of the packets of the series of packets;

wherein the step of transmitting comprises, upon receiving the complete series of packets

that represent the reference version of the audio signal waveform, transmitting the

second version of the reference version of the audio signal waveform to the

originating device over a reliable Transmission Control Protocol (TCP)

connection, for computing the audio signal degradation that occurred in a path

from the originating device to the switching device.

22.   (original) The method of claim 21, wherein the steps are performed by an intermediate
network switching device.

23.   (original) The method of claim 21, wherein the steps are performed by a network router.

24.   (currently amended) A computer-readable storage medium ~~carrying~~ storing one or more

sequences of instructions for determining the source of audio signal degradation in an

Internet Protocol (IP) telephony environment, which instructions, when executed by one

or more processors, cause the one or more processors to carry out the steps of:

for each switching device of a set of switching devices that are configured on a network

between a first endpoint and a second endpoint,

transmitting, from an originating device to the switching device, a reference

version of an audio signal waveform;

receiving a second version of the reference version of the audio signal waveform

that represents the waveform after transmission at least to the switching

device;

computing audio <u>signal</u> degradation that occurred between the originating device

and the switching device by comparing the reference version of the audio

<u>signal</u> waveform with the second version of <u>the reference version of</u> the

audio <u>signal</u> waveform; and

determining the source of audio <u>signal</u> degradation in a path between the first

endpoint and the second endpoint based on the audio <u>signal</u> degradations

associated with each of the switching devices of the set of switching

devices.

25.   (currently amended) The computer-readable <u>storage</u> medium of claim 24, wherein the

instructions cause the one or more processors to carry out the step of computing audio

<u>signal</u> degradation by computing audio <u>signal</u> degradation with a perceptual measure.

26.   (currently amended) The computer-readable <u>storage</u> medium of claim 24, wherein the

instructions cause the one or more processors to carry out the step of computing audio

<u>signal</u> degradation by computing audio <u>signal</u> degradation using Perceptual Evaluation of

Speech Quality (PESQ) techniques.

27.   (currently amended) The computer-readable <u>storage</u> medium of claim 24, wherein the

instructions cause the one or more processors to carry out the step of receiving by

receiving the second version of <u>the reference version of</u> the audio <u>signal</u> waveform at the

originating device from the switching device.

28.   (currently amended) The computer-readable <u>storage</u> medium of claim 27, wherein the

instructions cause the one or more processors to carry out

the step of receiving by receiving the second version of <u>the reference version of </u>the audio

signal waveform over a reliable <u>Transmission Control Protocol (TCP)</u> connection

after the switching device timestamps packets that it received that correspond

with the reference version <u>of the audio signal waveform </u>that was transmitted by

the originating device and buffers the packets before sending them to the

originating device over the reliable TCP connection; and

the step of computing the audio <u>signal </u>degradation by computing the audio <u>signal</u>

degradation that occurred in a path from the originating device to the switching

device.

29. (currently amended) The computer-readable <u>storage </u>medium of claim 24, wherein the

instructions cause the one or more processors to carry out

the step of receiving <s>by receiving</s> the second version of <u>the reference version of </u>the audio

<u>signal </u>waveform at the originating device from the switching device; and

the step of computing the audio <u>signal </u>degradation by computing the audio <u>signal</u>

degradation that occurred in a round-trip path between the originating device and

the switching device.

30. (currently amended) The computer-readable <u>storage </u>medium of claim 24, wherein the

instructions cause the one or more processors to carry out

the step of receiving <s>by receiving</s> the second version of <u>the reference version of </u>the audio

<u>signal </u>waveform at the switching device; and

the step of computing by computing the audio <u>signal </u>degradation at the switching device.

31.   (currently amended) The computer-readable <u>storage</u> medium of claim 30, wherein the

instructions cause the one or more processors to carry out:

for each switching device of a set of switching devices, receiving from the switching

device a measure of the audio <u>signal</u> degradation that was computed at the

switching device.

32.   (currently amended) The computer-readable <u>storage</u> medium of claim 24, wherein the

instructions cause the one or more processors to carry out:

determining the set of network switching devices that are configured on the network

between the first endpoint and the second endpoint.

33.   (currently amended) The computer-readable <u>storage</u> medium of claim 24, wherein the

instructions cause the one or more processors to carry out:

determining the set of network switching devices that are configured on the network

between the first endpoint and the second endpoint by determining a set of

network switching devices that are in a path from the first endpoint to the second

endpoint.

34.   (currently amended) The computer-readable <u>storage</u> medium of claim 33, wherein the

instructions cause the one or more processors to carry out:

determining the set of network switching devices that are configured on the network

between the first endpoint and the second endpoint by determining the set of

network switching devices that are configured in a path from the second endpoint

to the first endpoint.

35.   (currently amended) The computer-readable <u>storage</u> medium of claim 34, wherein the path from the first endpoint to the second endpoint is different than the path from the second endpoint to the first endpoint.

36.   (currently amended) The computer-readable <u>storage</u> medium of claim 24, wherein the set of switching devices comprises every switching device configured on a path between the first endpoint and the second endpoint.

37.   (currently amended) The computer-readable <u>storage</u> medium of claim 24, wherein the set of switching devices comprises a subset of the switching devices configured on a path between the first endpoint and the second endpoint.

38.   (currently amended) The computer-readable <u>storage</u> medium of claim 24, wherein the instruction cause the one or more processors to carry out the step of transmitting by transmitting to each switching device of the set of switching devices in a sequential order from a switching device that is nearest to the first endpoint to a switching device is that is nearest to the second endpoint.

39.   (currently amended) The computer-readable <u>storage</u> medium of claim 24, wherein the steps are performed by one or more intermediate network switching devices.

40.   (currently amended) The computer-readable <u>storage</u> medium of claim 24, wherein the steps are performed by one or more network routers.

41.   (currently amended) A computer- readable <u>storage</u> medium <s>carrying</s> <u>storing</u> one or more sequences of instructions for determining audio <u>signal</u> degradation in a path of an <u>Internet</u>

Protocol (IP) telephony environment, which instructions, when executed by one or more

processors, cause the one or more processors to carry out the steps of:

receiving from an originating device, at a network switching device, a reference version

>of an audio signal waveform; and

transmitting to the originating device a second version of the reference version of the

>audio signal waveform that represents the audio signal waveform after

>transmission at least to the network switching device, for computing audio signal

>degradation that occurred in a path between the originating device and the

>network switching device by comparing the reference version of the audio signal

>waveform with the second version of the reference version of the audio signal

>waveform.

42.   (currently amended) The computer-readable storage medium of claim 41, wherein the

steps are performed by one or more processors configured on an intermediate network

switching device.

43.   (currently amended) The computer-readable storage medium of claim 41, wherein the

steps are performed by one or more processors configured on a network router.

44.   (currently amended) The computer-readable storage medium of claim 41, wherein the

reference file is received as a series of packets, and wherein the instructions cause the one

or more processors to carry out the steps of:

attaching a timestamp to each of the packets of the series of packets;

buffering each of the packets of the series of packets;

wherein the step of transmitting comprises, upon receiving the complete series of packets

that represent the reference version of an audio signal waveform, transmitting the

second version of the reference version of the audio signal waveform to the

originating device over a reliable Transmission Control Protocol (TCP)

connection, for computing the audio signal degradation that occurred in a path

from the originating device to the switching device.

45.   (currently amended) The computer-readable storage medium of claim 4[[1]]4, wherein

the steps are performed by one or more processors configured on an intermediate network

switching device.

46.   (currently amended) The computer-readable storage medium of claim 4[[1]]4, wherein

the steps are performed by one or more processors configured on a network router.

47.   (currently amended) A system for determining the source of audio signal degradation in

an Internet Protocol (IP) telephony environment, the system comprising:

means for transmitting a reference version of an audio signal waveform from an

originating device to each switching device of a set of switching devices that are

configured on a network between a first endpoint and a second endpoint;

means for receiving a second version of the reference version of the audio signal

waveform that represents the waveform after transmission at least to each

respective switching device of the set of switching devices;

means for computing audio signal degradation that occurred between the originating

device and each switching device of the set of switching devices by comparing

the reference version of the audio signal waveform with the second version of the

reference version of the audio signal waveform; and

means for determining the source of audio signal degradation in a path between the first

endpoint and the second endpoint based on the audio signal degradations

associated with each of the switching devices of the set of switching devices.

48.   (original) The system of claim 47, wherein the system is configured on a network router.

49.   (currently amended) A system for determining audio signal degradation in a path of an

Internet Protocol (IP) telephony environment, the system comprising:

means for receiving from an originating device, at a network switching device, a

reference version of an audio signal waveform; and

means for transmitting to the originating device a second version of the reference version

of the audio signal waveform that represents the audio signal waveform after

transmission at least to the network switching device, for computing audio signal

degradation that occurred in a path between the originating device and the

network switching device by comparing the reference version of the audio signal

waveform with the second version of the reference version of the audio signal

waveform.

50.   (original) The system of claim 49, wherein the system is configured on a network router.

51.   (currently amended) A network device that can determine the source of audio signal

degradation in an Internet Protocol (IP) telephony environment, the device comprising:

a network interface;

a processor coupled to the network interface and receiving messages from a network

    through the network interface;

a computer-readable storage medium comprising storing one or more stored sequences of

    instructions which, when executed by the processor, cause the processor to carry

    out the steps of:

    for each switching device of a set of switching devices that are configured on a

        network between a first endpoint and a second endpoint,

        storing a reference version of an audio signal waveform at an originating

            device;

        transmitting, from an the originating device to the switching device,

            [[a]]the reference version of an the audio signal waveform;

        receiving a second version of the reference version of the audio signal

            waveform that represents the waveform after transmission at least

            to the switching device;

        computing audio signal degradation that occurred between the originating

            device and the switching device by comparing the reference

            version of the audio signal waveform with the second version of

            the reference version of the audio signal waveform; and

    determining the source of audio signal degradation in a path between the first

        endpoint and the second endpoint based on the audio signal degradations

        associated with each of the switching devices of the set of switching

        devices; and

storing an identifier of the source of audio signal degradation.

52.   (currently amended) A network device that can determine audio signal degradation in a

path of an Internet Protocol (IP) telephony environment, the device comprising:

a network interface;

a processor coupled to the network interface and receiving messages from a network

through the network interface;

a computer- readable storage medium comprising storing one or more stored sequences

of instructions which, when executed by the processor, cause the processor to

carry out the steps of:

receiving from an originating device, at a network switching device, a reference

version of an audio signal waveform; and

transmitting to the originating device a second version of the reference version of

the audio signal waveform that represents the audio signal waveform after

transmission at least to the network switching device, for computing audio

signal degradation that occurred in a path between the originating device

and the network switching device by comparing the reference version of

the audio signal waveform with the second version of the reference

version of the audio signal waveform.